

Setting learning objectives

Clinical teachers may be involved with students and trainees on a variety of different programmes who are required to achieve a diverse range of learning outcomes or objectives. Teachers who better understand the relationship between learning outcomes and the planning and delivery of educational activities can help learners receive more from their education and training.

This article explores the role of the clinical teacher in setting learning objectives for students or trainees in the context of the different curricula they may be following. It considers the roles of the individuals and organizations involved – the learner, the teacher and professional and health-care organizations – alongside some core principles for writing clear and achievable learning objectives.

Aims, objectives and outcomes

Medical education uses a range of terms – aims, learning outcomes, learning objectives, competencies – to describe what learners should achieve as a result of educational interventions. This can be confusing, but it is often important that end points are clearly defined before the learning takes place. It is like planning a journey – if you don't know where you intend to go before you start, you may end up somewhere you don't want to be.

An aim usually defines what the programme or teacher is trying to achieve overall. It tells participants what the programme or session is about. For example: 'the aim of this session is to revise the principles of resuscitation and test your learning with a quiz'.

Learning objectives state the observable and measurable behaviours that learners should exhibit as a result of participating

in a learning programme. An example of a learning (or instructional) objective would be: 'on completion of this course, the learner should be able to describe the common causes of a unilateral headache in an adult'.

Latterly, there has been a shift from defining such specific instructional objectives to providing more broad-based learning outcomes that are intended to arise as a result of the programme.

Harden (2002) suggests that learning outcomes are essentially more 'intuitive and user-friendly' than objectives: they are 'broad statements... that recognise the authentic interaction and integration in clinical practice of knowledge, skills and attitudes and the artificiality of separating these'. We can also view outcomes as learner goals. An example of this broader based approach might be: 'Graduates must know about biological variation, and have an understanding of scientific methods, including both the technical and ethical principles used when designing experiments' (General Medical Council, 2003).

Increasingly, particularly at postgraduate level, learners are required to demonstrate specific competencies. An example around history taking at 1st year foundation trainee level might be that the doctor:

'routinely undertakes structured interviews ensuring that the patient's concerns, expectations and understanding are identified and addressed or demonstrates clear history taking and communication with patients' (The Foundation Programme, 2007).

In practice, the terms 'objectives', 'outcomes' and 'competencies' are often used interchangeably. Grant (2007) notes that it is fitness for purpose that is important and that the main purposes of stating intended learning achievements are to:

- Inform learners of what they should achieve
- Inform teachers about what they should help learners to achieve

- Form the basis of the assessment system, so that everyone knows what will be assessed

- Reflect accurately the nature of the profession into which the learner is being inducted and the professional characteristics that must be acquired.

Defining outcomes also helps us achieve what Biggs (1996) calls 'constructive alignment', where objectives, teaching methods and assessments are aimed at delivering the same thing. It is not just in face-to-face teaching that learning outcomes need to be aligned; learning materials, library and online support all have to be constructed to help the learner achieve the specified outcomes of the training programme.

Hierarchies of intended outcomes

In formal education, learning generally takes place within a predetermined framework where the specificity of outcomes at each stage increases towards the bottom of an educational hierarchy (Figure 1). For example, the General Medical Council defines very broad outcomes in the documentation that supports the training of medical students. *Tomorrow's Doctors* states that in order to provide good clinical care, 'graduates must be able to show that they can meet the following outcome: know about, understand and be able to apply and integrate the clinical, basic, behavioural and social sciences on which medical practice is based' (General Medical Council, 2003).

Such overarching statements are interpreted and developed further by Royal colleges and medical schools to generate curricula, often defined as broad outcomes, but which are then developed into much more specific objectives at programme, course, module and unit level, often framed in terms of knowledge, skills and professional attitudes. For foundation and specialty training programmes, learning outcomes may be defined in generic terms as well as more specifically related to the clinical context and level. At the level of the individual teaching episode, further

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specificity arises as the intended outcomes of a particular educational intervention, teaching or supervision session, are tailored to the needs of individual learners.

Prescription or process?

Learning outcomes or objectives can be seen as the building blocks of any learning programme or teaching or learning event and as key to ensuring that all aspects of a programme – learning methods, assessment, evaluation and quality assurance – link together. The teacher’s role is to ensure that each session integrates with the whole curriculum by providing opportunities for learners to achieve the stated objectives and thus be capable of passing assessments.

When planning a session or programme, paying attention to how the outcomes will be achieved, assessed and evaluated requires active and overt consideration of the educational process: the interaction of teachers, students and knowledge. Stenhouse (1975) thought of an objective-led curriculum as an educational ‘straitjacket’, proposing a shift to a process-driven model in which the facilitation of learning is the central concern, and outcomes become unpredictable. Hussey and Smith (2008) call this the ‘corridor of tolerance’, allowing space for learning outcomes to emerge through the learning process. A thoughtful curriculum includes outcomes with varying levels of detail, enabling achievement of tasks, while acknowledging the importance of the process of learning. Medical curricula are now re-emphasizing the importance of students and trainees having opportunities to become immersed in clinical contexts, learning through experience. An example of a process objective

might be: ‘to spend time with the district nurse and explore how the service works.’

Learning objectives and professional development

Two models help us understand how learning outcomes or objectives relate to learners’ professional development as they move from novice to expert.

Bloom

The first is found in Bloom’s taxonomy of objectives in the cognitive domain (1956), which describes how objectives related to cognitive development increase in complexity as learners develop deeper understanding, start to apply this knowledge and ultimately synthesize and evaluate what they have learned. From your own experience you will know that as your clinical understanding developed, you became better able to handle complex information from multiple sources and synthesize it quickly and precisely to make consistently accurate diagnoses and decisions. Although this runs counter to experiential learning approaches in which learning happens by ‘doing’ (Kolb, 1984), Bloom’s taxonomy has been highly influential in all areas of education.

Figure 2 shows how these levels increase in complexity as learners advance. Bloom’s model can be used to help write objectives or outcomes where they can be mapped on to the appropriate level, depending on what learners are expected to achieve. A common mistake in writing outcomes is to set them at the wrong level; either expecting learners to be able to do something for which they are not yet ready, or inappropriately linking them to particular teaching and learning methods or assessments.

Miller

Another model that is particularly useful for thinking about learning outcomes in relation to assessment of clinical competence is Miller’s pyramid (1990) (Figure 3). This model is similar to Bloom’s taxonomy in that there is a marked shift, as professionals develop expertise, from being able to demonstrate the knowledge underpinning competence (e.g. knowing theoretically how to examine an abdomen) to ‘doing in action’, where knowledge, skills and professional attitudes are synthesized and internalized into a seamless routine that can be carried out in different contexts.

Both these models can help us to match learning outcomes with our expectations of what the learner should be able to do at any stage. Students and trainees relate to knowledge and understanding at a more basic level – possibly in artificial or limited contexts – than to the actual high-level performance expected of consultants.

Figure 1. Levels at which learning outcomes may be defined.

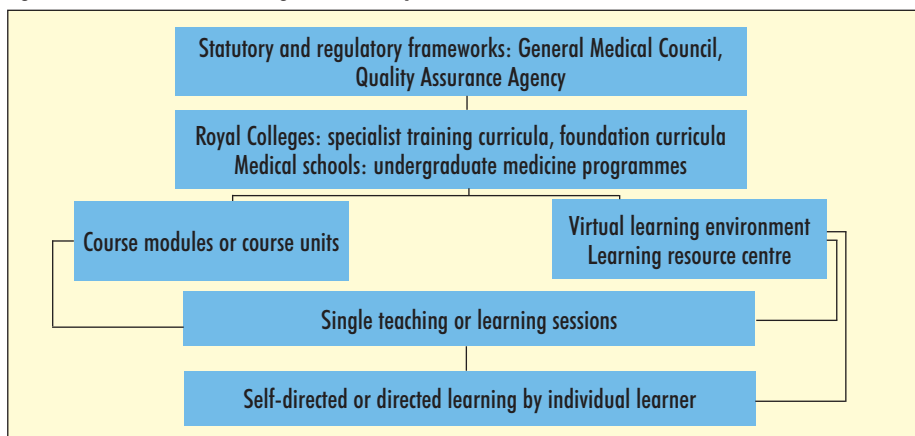


Figure 2. Thinking like a professional? Bloom’s taxonomy and professional development.

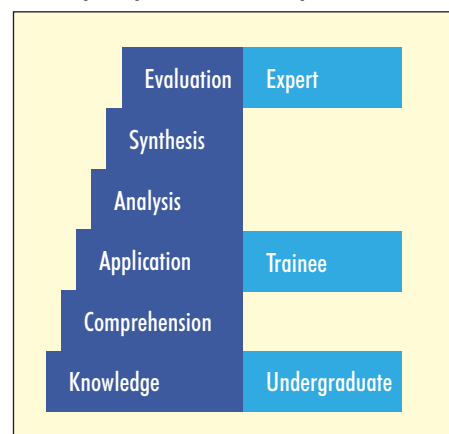
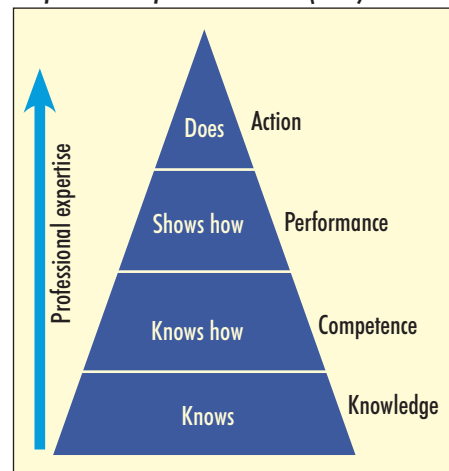


Figure 3. Miller’s pyramid for assessing clinical competence. Adapted from Norcini (2007).



Writing learning outcomes or objectives

Learning objectives will relate to one of the three domains described by Bloom (1956):

1. Cognitive (knowledge and intellectual skills)
2. Psychomotor (physical skills)
3. Affective (feelings and attitudes).

They specify the intended end point of engagement in a given learning activity and:

- Are written in the future tense
- Use easily understood language
- Relate to explicit statements of achievement and always contain verbs
- Clearly indicate the nature and/or level of learning required for achievement
- Avoid ambiguity or over-complexity
- Are SMART: specific, measurable, achievable, realistic and timebound.

When writing objectives, always start with a stem, such as: 'At the end of this session, learners will be able to...' then use a verb, that states specifically what the learners will be able to do, e.g. '...demonstrate...' followed by a clear statement of the topic of interest '...that they can administer an intramuscular injection'.

Knowledge objectives

When writing objectives that relate to knowledge, there are a number of useful verbs that can be used to map the learning outcome onto the relevant tier of Bloom's taxonomy (Table 1). An example might be: 'At the end of this session, learners will be able to describe the key features of hypertension in adults'. For this learning objective, typical teaching and learning methods might be a lecture, seminar, tutorial, problem-based learning case or clinical scenario. We are not asking the learners to apply knowledge, therefore assessment would aim to assess understanding and recall of the key features of hypertension in adults.

Skills objectives

Bloom suggested that skills objectives should be written in terms of competence. He called this the psychomotor domain (although this taxonomy was completed by others) and ascribed to it five levels:

1. Imitation (observes skill and tries to reproduce it)
2. Manipulation (performs skill from instruction)
3. Precision (reproduces skill with accuracy and proportion)
4. Articulation (combines one or more skills in sequence with harmony and consistency)
5. Naturalization (completes skilful tasks competently and automatically).

Note the similarity to Miller's pyramid.

An example of a skills-based objective at the level of 'precision' would be: 'At the end of the training session, learners will be able to insert a cannula into a peripheral vein accurately without causing a haematoma'. Teaching and learning methods for this domain may well include some background knowledge, such as relevant anatomy and physiology or equipment needs, but for learners to be able to perform this skill accurately, they need to practise. This may be on models, or with supervision and feedback. Assessment of competence would involve a number of observations, not just asking the learner to describe what he/she would do.

Attitudinal objectives

Attitudinal objectives are often seen as the most difficult to write because they describe patterns of observable behaviour. Bloom called this the affective domain and again it has five levels:

1. Receiving (aware of external stimuli, e.g. listening)
2. Responding (complies with expectations in response to stimuli)

3. Valuing (displays behaviour consistent with a single belief without coercion)
4. Organizing (shows commitment to a set of values by behaviour)
5. Characterizing (behaviour consistent with a value system).

An example in this domain (at the level of responding) might be: 'At the end of the communications skills course, learners will be able to demonstrate awareness of cultural differences in working with simulated patients in three different clinical scenarios.'

This learning objective focuses on the learners being able to show that they understand and can respond to different (pre-defined in this case) cultural issues that patients may present. This objective states clearly that learners are not expected to demonstrate this awareness outside a simulated context, so not in the 'real world' of the ward.

Lesson planning

It is at the level of the individual teaching session that clinical teachers need to integrate the learning needs of their students or trainees with defined learning objectives. This can be achieved by asking four fundamental questions when planning teaching (adapted from Spencer, 2003):

1. Who am I teaching? (The number of learners and their level)
2. What am I teaching? (The topic or subject, the type of expected learning, e.g. knowledge, skills or attitudes)
3. How will I teach it? (Teaching and learning methods, length of time available, location of teaching session, access to patients and resources)
4. How will I know if the students understand? (Informal and formal assessments, questioning techniques, feedback from learners).

You might also want to ask:

- What do they know already?
- Where have they come from and what are they going on to next?
- What do the learners want as a result of the teaching and how can I find this out?
- How can I build in sufficient flexibility to cope with emerging needs?

For each teaching session it helps to formulate a 'lesson plan'. This may be very detailed or a simple broad brush outline, but before each session you should:

Table 1. Writing objectives in the cognitive domain

	Description	Useful verbs for outcome level statements
Knowledge	Recall of information previously presented	Define, list, name, recall, record
Comprehension	Grasping the meaning but not extending it beyond the present situation	Describe, explain, discuss, recognize
Application	Using the rules and principles	Apply, use, demonstrate, illustrate, practice
Analysis	Breaking down components to clarify	Distinguish, analyse, calculate, test, inspect
Synthesis	Arranging and assembling elements into a whole	Design, organize, formulate, propose
Evaluation	Ability to judge X for a purpose	Judge, appraise, evaluate, compare, assess

- Define your aims and learning outcomes or objectives
- Think about the structure of the session and timing of activities
- Decide on the best teaching and learning methods to achieve learning outcomes
- List content and key topics, research more if needed
- Refine your lesson plan
- Identify learning resources and support materials
- Finalize any linked assessment or evaluation.

Common pitfalls and how to avoid them

Careful planning helps teachers avoid some common pitfalls when setting learning outcomes for teaching and learning activities. *Table 2* lists some ways teachers might avoid these.

Conclusions

Setting learning objectives is a central activity for clinical teachers and the concept of pre-determined intended outcomes underpins all teaching, learning and assessment activities. Opportunities for setting learning objectives arise in formal planned educational activities as well as in more informal 'moment to moment' situations. Clinical teachers can optimize teaching and learning opportunities that arise in daily practice and support learners' professional development, through an in-depth understanding of the programme of study in which the learner is engaged, effective lesson planning and a continuous consideration of learners' needs. **BJHM**

Conflict of interest: Professor Swanwick is the Faculty Development Lead for the London Deanery and Professor McKimm was commissioned by the London Deanery to lead on the development of the suite of e-learning modules from which these articles have been derived.

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Table 2. Common pitfalls and how to avoid them

Some pitfalls	...and how to avoid them
Trying to achieve too much in one session	Plan the session carefully, and allow time for discussion, activities and reflection
Trying to cover too many learning outcomes	Stick to a small number of learning outcomes (fewer than five) and be as specific as you can in terms of exactly what you are expecting the learners to be able to do at the end of the session
Learning outcomes not linked to the programme or to learner needs and prior experience	Make sure you know and understand the programme outcomes, the assessments the learners are working towards and the expectations of you by course organizers, particularly the outcomes and assessments that relate specifically to your session(s). Include informal and formal activities that help you understand and identify the needs of the learners
Learning outcomes defined at the wrong level	Think carefully about exactly what you are expecting the learners to be able to do, think about their 'learning journey': their prior learning and the stage they have reached
Learning outcomes in the wrong domain	Split objectives that cover more than one domain and design the teaching to enable learners to achieve all the outcomes. If you are assuming that learners have the underpinning knowledge or earlier practice to carry out a complex skill, check it out, or break the skill down into sub-objectives
Learning outcomes not specific enough	Practice writing them and think about how you might assess the objective
Learning outcomes not linked to teaching and learning methods	Select the teaching and learning methods that help learners achieve the outcome, e.g. if skills, need demonstration, practice (simulation or real), possibly broken down into steps, and feedback, not just reading about it or watching a video
Learning outcomes not linked to assessment	Link the learning outcomes to an assessment, i.e. how will you and the learner know that he/she has achieved the outcome satisfactorily? Make sure the assessment assesses the right domain, e.g. skills are assessed by practical clinical assessments such as objective structured clinical examinations
Learning outcomes not practical nor feasible	Often there are too many learning outcomes specified to cover in the time available or with the number or stage of learners. Check out equipment, rooms, other resources and facilities
Learning outcomes not linked to evaluation, little capacity to review and change	If you are told what the outcomes are rather than setting them for yourself, be aware of the process by which you can feed back to course organizers about how the session has worked. Think about making the links between learning outcomes, teaching and learning methods, assessment and evaluation transparent so you can refresh the curriculum. Do not assume that learning outcomes are set in stone

KEY POINTS

- Setting learning objectives underpins effective clinical teaching, helping to determine teaching, learning and assessment methods.
- Understanding the curriculum, learners' needs and the educational context is essential when planning teaching sessions.
- Learning outcomes may be defined in terms of broad goals, instructional objectives or competencies.
- Learning outcomes should be defined in terms of what the learner should be able to do as a result of an educational intervention.
- Intended outcomes should be SMART: specific, measurable, achievable, realistic and timebound.